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IS 11227 (1985): Gelatin for sizing of paper [CHD 15: Paper and its products]

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*Indian Standard*  
SPECIFICATION FOR  
GELATIN FOR SIZING OF PAPER

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR

### GELATIN FOR SIZING OF PAPER

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*Indian Standard*

**SPECIFICATION FOR  
GELATIN FOR SIZING OF PAPER**

**0. F O R E W O R D**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 10 February 1985, after the draft finalized by the Paper and Its Products ( Excluding Packaging Materials ) Sectional Committee had been approved by the Chemical Division Council.

**0.2** Gelatin is widely used for surface sizing of speciality papers, namely, paper used in making currency notes, bank cheques, legal and other documents.

**0.3** The quality of this material is vital for maintaining desired quality in currency and bank note paper and the manufacturers of these speciality papers are facing great difficulty in procuring material of desired quality.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard prescribes the requirements and method of sampling and test for gelatin for sizing of paper.

**2. GRADES**

**2.1** The material shall be in the form of the following three grades:

- a) Grade 1,
- b) Grade 2, and
- c) Grade 3.

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\*Rules for rounding off numerical values ( revised ).

### 3. REQUIREMENTS

**3.1 Description** — The material shall be in the form of flakes and light brown colour.

**3.2** The material shall also comply with the requirements given in Table 1 when tested in accordance with the methods prescribed in Appendix A. Reference to the relevant clauses of Appendix A is given in col 6 of the table.

**TABLE 1 REQUIREMENTS FOR GELATIN**

SL No.	CHARACTERISTIC	REQUIREMENT			METHOD OF TEST, REF TO CL NO. IN APPENDIX A
		Grade 1	Grade 2	Grade 3	
(1)	(2)	(3)	(4)	(5)	(6)
i)	pH	5.0 to 8.5	5.0 to 8.5	5.0 to 8.5	A-3
ii)	Total ash, percent by mass, <i>Max</i>	2.5	2.5	2.5	A-4
iii)	Gel strength	To pass the test	To pass the test	To pass the test	A-5
iv)	Viscosity at 40°C, cP, <i>Min</i>	18	16	12	A-6
v)	Chloride (as NaCl), percent by mass, <i>Max</i>	2	2	2	A-7
vi)	Keeping quality, hours, <i>Min</i>	72	72	72	A-8
vii)	Insoluble matter, percent by mass, <i>Max</i>	0.5	0.5	0.5	A-9
viii)	Water absorption, <i>Min</i>	18 times dry mass of gelatin	18 times dry mass of gelatin	18 times dry mass of gelatin	A-10
ix)	Grease content, percent by mass, <i>Max</i>	0.3	0.3	0.3	A-11

### 4. PACKING, MARKING AND STORAGE

**4.1 Packing** — The material shall be securely packed in well-defined wide mouth containers with tight fitting lids.

**4.2 Marking** — Each container shall be marked legibly to give the following information:

- a) Name of the material, with specific mention that the material is for paper sizing;

- b) Name and address of the manufacturer;
- c) Grade of the material;
- d) Minimum net content; and
- e) Batch or code number.

**4.2.1** The containers may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

**4.3 Storage** — The material shall be stored in a cool and dry place.

## 5. SAMPLING

**5.1** The method of drawing representative samples of the material and the criteria for determining conformity of the material to the requirements of this specification shall be as prescribed in Appendix B.

## A P P E N D I X A

( *Clause 3.2* )

### METHODS OF TEST FOR GELATIN FOR SIZING OF PAPER

#### A-1. QUALITY OF REAGENTS

**A-1.1** Unless specified otherwise, pure chemicals and distilled water (*see IS : 1070-1977\**) shall be employed in tests.

**NOTE** — ‘Pure chemicals’ shall mean chemicals that do not contain impurities which affect the results of analysis.

#### A-2. METHOD OF DISSOLVING SOLID SAMPLE

**A-2.1 Method of Dissolving Solid Sample** — Take the powdered sample in a beaker and add the requisite amount of cold water, stirring with a thin metal or glass rod. Place a watch glass on the beaker and allow to soak for 3 hours. The temperature of soaking shall not be above 22°C. Then heat the beaker in a water bath for about 15 minutes taking

\*Specification for water for general laboratory use (*second revision*).

care that the final temperature of the solution when in the bath reaches, but does not go beyond 40°C. This is secured by adjustment of the bath temperature which shall on no account be above 70°C. During this heating period gently stir the solution with a rod. Take care that the gelatin is completely dissolved; this may be ascertained by lifting up the beaker and inspecting through the bottom. When the sample has all dissolved, remove the beaker from the water bath.

### **A-3. DETERMINATION OF pH**

#### **A-3.1 Apparatus**

**A-3.1.1 pH Meter** — with glass electrode.

**A-3.2 Procedure** — Dissolve 1 g of the powdered sample by shaking after careful addition to a small quantity by soft warm, recently boiled, water in a stoppered flask of chemically resistant glass, and dilute the volume to 100 ml with recently boiled and cooled water. After shaking and allowing to cool to room temperature, determine the pH value of the solution by using the pH meter. Care shall be taken throughout the operation to avoid absorption of carbon dioxide from the air.

### **A-4. DETERMINATION OF TOTAL ASH**

**A-4.1 Procedure** — Take about 2 or 3 g of the powdered material accurately weighed, in a tared platinum or silica dish. Scatter the material in a fine even layer on the bottom of the dish. Incinerate by gradually increasing the heat, not exceeding dull red heat ( maximum 500°C ) until free from carbon, cool and weigh. If it is not possible to obtain a carbon-free ash in this way, extract, the charred mass with hot water, collect the residue on an ashless filter-paper, incinerate the residue and filter-paper, add the filtrate, evaporate to dryness and ignite at a low temperature. Calculate the percentage of ash with reference to the air-dried material.

### **A-5. DETERMINATION OF GEL STRENGTH**

**A-5.0 General** — If there is no agreed sample for comparison, it becomes necessary to measure the gel strength of the sample for test under arbitrary conditions. This method gives the mass in grams necessary to produce by means of a plunger of 12·7 mm diameter, a 4 mm depression in a jelly of 12·5 percent concentration by mass, matured at 10°C.

**A-5.1 Principle** — A 12·5 percent solution of the sample is prepared in a wide-mouthed test bottle and kept for 16 to 18 hours in a thermostatic bath at 10°C. The resulting jelly is tested in the bloom type gelometer.

### A-5.2 Apparatus

**A-5.2.1 Bottle** — Internal diameter  $59 \pm 1$  mm, and approximately 85 mm high, having a capacity of approximately 155 ml. A stopper of rubber or cork approximately 43 mm in diameter should fit snugly into the neck of the bottle. It shall be pierced centrally with an air vent about 0.5 mm in diameter.

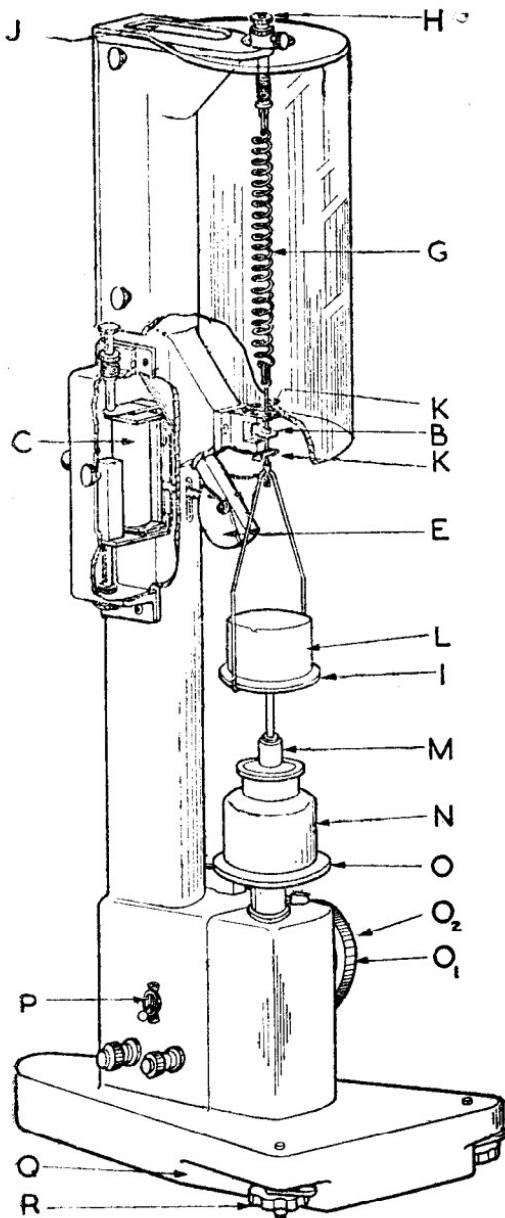
**A-5.2.2 Thermostatic Bath (Chill Bath)** — Totally enclosed, maintained at  $10.0 \pm 0.1^\circ\text{C}$ .

**A-5.2.3 Bloom Type Gelometer (Fig. 1 and 2)** — Adjusted to give a 4 mm depression and to deliver shot at the rate of 200 grams per 5 seconds, when the hopper contains 800 g of polished No. 12 chilled shot. Shot passing through 1.40 mm IS Sieve and retained on a 1.18 mm IS Sieve is satisfactory. Further details of the instrument are given in Fig. 1 and Fig. 2.

**A-5.3 Dissolving the Sample** — Dissolve 15 g of the sample in 105 ml of water in the wide neck bottle taking the precautions (as in A-2.1), closing the bottle with the stopper instead of a watch glass. To prevent caking, the bottle should be swirled vigorously when adding the water, and occasionally during dissolving. At this stage, take care not to build up more froth, by excessive agitation, to prevent its over-flowing while shifting the bottle to the chill bath. Particular care is necessary to see that the gelatin is all dissolved and the solution uniform. Striations in the solution after swirling the bottle indicate the need for more prolonged agitation. The striations are best seen in a bright light. Place a finger over the perforation in the stopper and invert the bottle several times to mix in the water that has condensed on the walls of the bottle and the under-side of the stopper.

**A-5.4 Chilling the Solution** — To prevent cracking, allow the bottle to cool for 15 minutes at room temperature, and then place in the thermostatic bath for not less than 16 hours, and not more than 18 hours. Ensure that the platform of the thermostatic bath is horizontal and that the bottle stands evenly on it.

**A-5.5 Procedure for Determining Gel Strength** — To work properly, the gelometer (Fig. 1 and 2) shall stand perfectly level on a rigid support. The leveling screws  $R$  shall be adjusted until the bottle platform  $O$  is horizontal. This shall be checked by using a spirit level on the platform in two directions at right angles. The spindle  $B_1$  should not then normally be rubbing against the guides  $K$ ; any contact which does occur shall be insufficient to restrict free movement. Do not change position of the guides  $K$  as they have to be kept directly under the point of suspension of spring  $G$ .



- A<sub>1</sub>* Upper contact
- A<sub>2</sub>* Lower contact
- B* Silver disc
- B<sub>1</sub>* Disc spindle
- C* Relay
- D* Relay catch
- E* Cut-off
- F* Cut-off arm
- G* Spring
- H* Thumbscrew nut
- I* Pan
- J* Shot hopper
- K* Guides
- L* Shot receiver
- M* Plunger
- N* Test bottle
- O* Platform
- O<sub>1</sub>* Rack and pinion
- O<sub>2</sub>* Fine adjustment
- P* Switch
- Q* Base
- R* Levelling screw
- S* Shot rate adjustment
- T* Locknut

FIG. 1 BLOOM TYPE GELOMETER

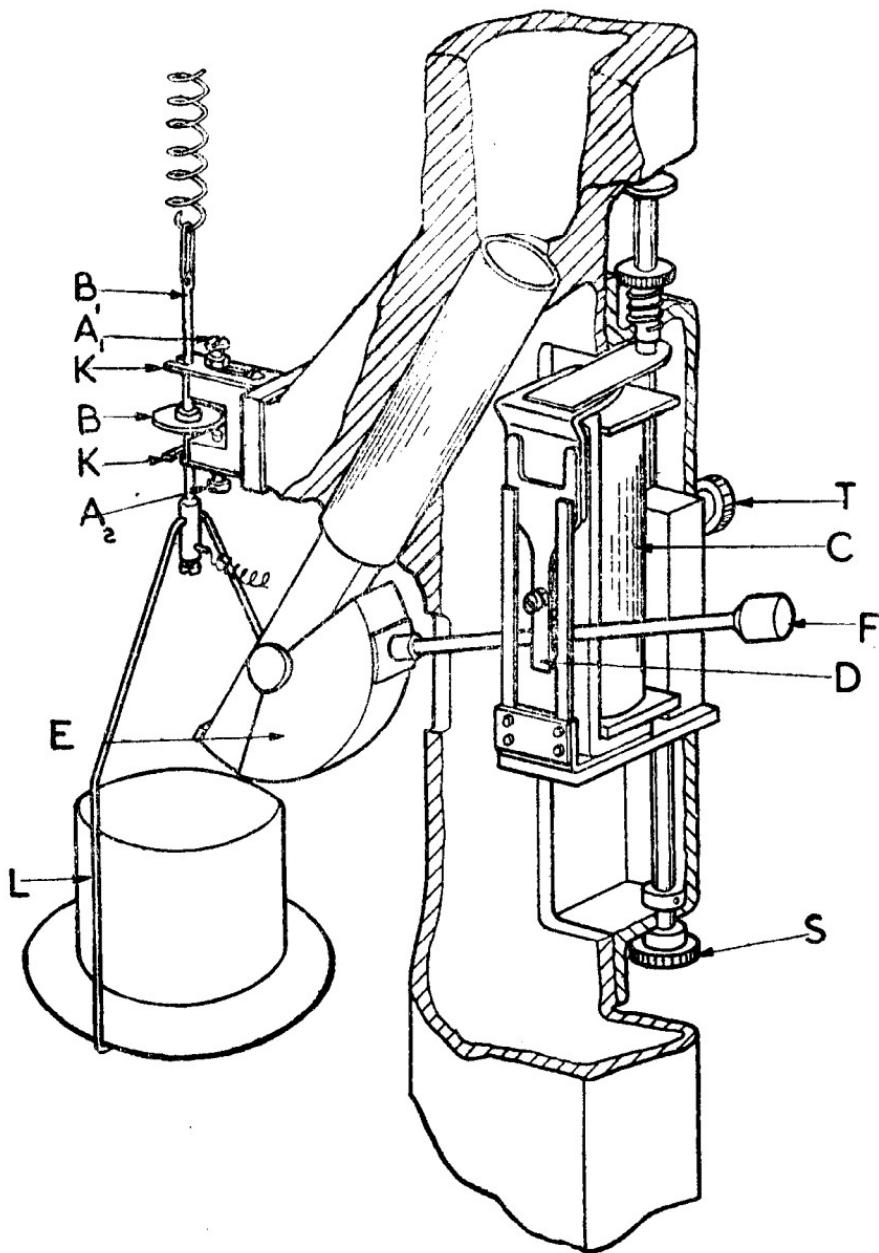


FIG. 2 BLOOM TYPE GELOMETER: DETAIL OF RELAY AND CONTACT SYSTEM

The spring should be of such stiffness that between 2 and 3 g mass placed on the pan *I* shall bring the disc *B* from top contact *A<sub>1</sub>* to lower contact *A<sub>2</sub>*.

The mass of the pan system shall be counterbalanced by such tension in the spring *G* that equilibrium is produced when contact disc *B* is just barely resting on the lower contact point *A<sub>2</sub>*. This condition is produced by first closing the electrical circuit by means of switch *P* and then turning thumbscrew nut *H* until disc *B* makes the first electrical contact with lower contact point *A<sub>2</sub>*. When properly set, a slight vibration of the instrument will cause a succession of 'make' and 'break' in the circuit, producing a sound in the relay *C* very much like that of a telegraph sounder.

To make a test of the gel strength of a given sample, close the electrical circuit by means of switch *P*, centre the test bottle *N* on platform *O*, and by means of the rack and pinion elevating mechanism *O<sub>1</sub>* raise the jelly until disc *B* almost makes contact with point *A<sub>1</sub>*. Then, with the fine adjustment, on rack and pinion *O<sub>2</sub>* bring the disc into the lightest positive electrical contact with contact point *A<sub>1</sub>*. This is indicated by sparking and by the telegraph sounder effect noted above. Quickly place the shot receiver *L* on pan *I* and immediately lift the arm *F* rapidly but smoothly till it is engaged by the relay catch *D*. The flow of shot causes plunger *M* to depress the surface of the jelly until disc *B* makes contact with contact point *A<sub>2</sub>*. This closes the circuits and trips the relay stopping the flow of shot. The mass of the shot delivered into the receiver *L*, plus the mass of the shot receiver, measures the bloom strength of the sample. After the combined mass is determined, the shot is emptied back into hopper *J* and the instrument is then ready for another test.

If the sample gives a strength of less than 100 g, the jelly shall be prepared and tested at a higher concentration, that is, 25 percent and a note made of this in the report.

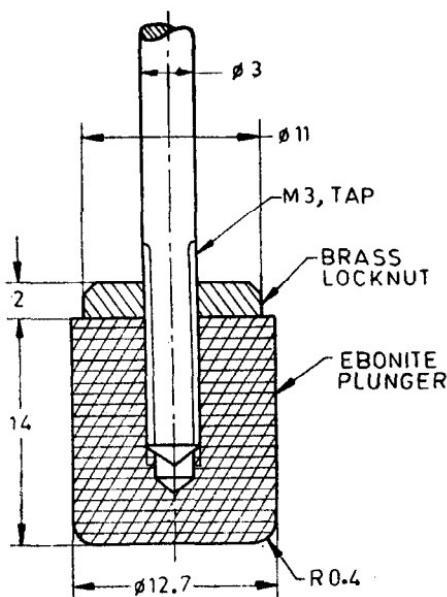
If the sample gives a strength above 400 g, the gel shall be prepared at a 6·66 percent concentration, and a note made of this in the report.

**A-5.6 Expression of Results** — Express the results, to the nearest gram, as 'grams bloom' for a 12·5 percent concentration by mass.

**A-5.7 Test Report** — The report shall give the result and the method used, and shall mention any circumstances which may have affected the result including the concentration of the jelly used in the test if different from 12·5 percent.

**A-5.8 Checking the Bloom Determination** — The bloom determination may be checked completely in three stages.

**A-5.8.1** The diameter of the gelometer plunger and the radius of curvature of its lower circular edge (*see* Fig. 3) should be verified by measurement. A profilemeter is a satisfactory instrument for measuring the radius of curvature.



All dimensions in millimetres.

FIG. 3 DETAIL OF PLUNGER FOR GELOMETER

**A-5.8.2** All other aspects of the performance of the gelometer itself may be tested by means of the 'dummy bloom' device. This device, illustrated in Fig. 4, utilizes the elastic deformation of spring steel to calibrate the bloom instrument. Four strips to cover a range of values are supplied with the device which is placed on the gelometer platform in the same way as a jelly. If the bloom readings for the strips deviate markedly from their standard values, then the bloom instrument should be examined for faults. A divergence of values as the bloom figure is raised indicates an incorrectly set gap, whereas a constant difference would suggest delays connected with the cut-off mechanism. It is necessary to be sure that setting the gap by the distance gauge gives nearly the correct values, otherwise the machine might be seriously out of adjustment without this being realized. When a machine approaches perfect adjustment using a distance gauge then it is more accurate to set the gap to give the standard readings of the dummy bloom, than to use a distance gauge for the final setting. The range of values given by the dummy bloom in successive readings with one strip is also a

useful indication of performance of the gelometer. Other uses of the dummy are:

- as a daily check on the gelometer, using the strip of strength nearest the values being measured;
- to compare observers; and
- to respect the machine after any alteration.

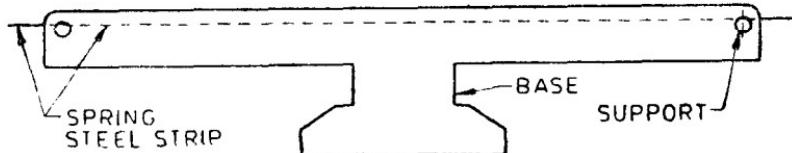


FIG. 4 DUMMY BLOOM DEVICE

**A-5.8.3** It remains to check melting and chilling conditions. This is most conveniently done by using standard samples. It should be stressed that all standard samples require correction for moisture content variations, where the measured moisture content differs by more than 0·4 percent from the value at the time of standardization. It should be noted that the use of standard samples is only an adequate check of melting and maturing provided the gelometer itself is correct. This can be ascertained as prescribed in **A-5.8.1** and **A-5.8.2**.

## A-6. DETERMINATION OF VISCOSITY

**A-6.0 General** — The viscosity of a sample of the gelatin is determined at 40°C with a U-tube viscometer.

### A-6.1 Apparatus

**A-6.1.1 Viscometer** — Any type of glass capillary viscometer should normally be suitable. It is essential that the time of efflux should be within the accurate range of the instrument chosen. The viscometer should be calibrated in metric units, that is centistokes.

**A-6.1.2** Thermostatic bath maintained at  $40 \pm 0\cdot2^\circ\text{C}$ .

**A-6.2 Procedure** — Place 15 g of the powdered sample in a corked bottle or flask, and add 105 ml of cold water. Swell and dissolve the sample in the manner specified in **A-2.1** then pour the liquid through a funnel, loosely plugged with cotton wool into the viscometer and allow to stand in the thermostatic bath for 15 minutes before taking the measurement as described in **A-6.2.1**.

**A-6.2.1** Apply suction or pressure to bring the liquid level to a point about 5 mm above the upper timing mark. Release the suction or pressure and record the flow time taken for the bottom meniscus to pass from the top edge of the upper timing mark and the top edge of the lower timing mark. Record the thermometer readings at the beginning of, during and at the end of the timed flow. Repeat the measurement of flow time immediately without emptying or recharging, until two successive flow times agree within 0·2 percent.

**A-6.3 Calculation and Expression of Results** — Express the results either as the kinematic viscosity in centistokes or as the dynamic viscosity in centipoises at 12·5 percent concentration and 40°C:

$$\text{Kinematic viscosity, } v = C t$$

where

$C$  = factor for the viscometer given in its calibration certificate; and

$t$  = mean flow time, in seconds.

$$\text{Dynamic viscosity, } \eta = v \rho$$

where

$v$  = kinematic viscosity; and

$\rho$  = density measured at the same temperature, in g/cm<sup>3</sup>.

## A-7. DETERMINATION OF CHLORIDES

**A-7.0 General** — The chloride content is an index of the behaviour of gelatin under various atmosphere conditions. The calcium oxide method has been selected because it avoids loss of chlorides.

**A-7.0.1** To a solution of a sample of the gelatin, calcium oxide is added, and the mixture is dried and ashed at 500°C. The residue is extracted with water and the neutralized extract titrated with silver nitrate.

### A-7.1 Reagents

**A-7.1.1 Calcium Oxide**

**A-7.1.2 Acetic Acid**

**A-7.1.3 Silver Nitrate Solution** — Dissolve 2·906 g of silver nitrate in distilled water and dilute to 100 ml.

**A-7.1.4 Potassium Chromate** — Dissolve 10 g of potassium chromate, ( $K_2CrO_4$ ) in water and dilute to 100 ml. Before use add a few drops of silver nitrate solution to every 100 ml and filter.

**A-7.2 Apparatus**

**A-7.2.1 Basin** — Made of nickel or platinum.

**A-7.2.2 Water Bath** — Filled with boiling water.

**A-7.2.3 Steam Bath**

**A-7.2.4 Muffle Furnace** — Electrically heated, controlled at 500°C.

**A-7.3 Procedure** — Weigh to the nearest 0.1 g about 5 g of the powdered sample in the basin, then add 100 ml of cold water and allow to soak for one hour. Heat on the water bath and add 5 g of calcium oxide. Dry on the steam bath and ignite in a muffle furnace until all organic matter is completely ashed. Extract the residue with water three times, filter and neutralize the filtrate with acetic acid. Transfer the solution, which should not amount to more than 50 ml, to a porcelain dish and titrate it with the silver nitrate solution, using 1 ml of the potassium chromate solution as indicator.

**A-7.4 Calculation**

$$\text{Chlorides (as NaCl), percent} = \frac{V}{M}$$

where

$V$  = volume in ml of the silver nitrate solution required, and  
 $M$  = mass in g of sample taken.

**A-8. DETERMINATION OF KEEPING QUALITY**

**A-8.0 General** — The rate of growth of fungi, yeasts, and bacteria is dependent, among other factors, upon temperature and upon water and preservative concentration. Dry gelatin is stable in storage for many years. Once solid gelatin is dissolved in water, more water is available for growth and the concentration of preservative (if any) is decreased. Therefore any practical test of keeping quality should preferably be made under the intended conditions of storage and use.

**A-8.0.1** The keeping quality test is intended simply as an index of the behaviour of the gelatin in practice and is not to be taken as a substitute for a more complete bacteriological examination.

**A-8.0.2** Evidence of microbiological activity is sought daily in a 20 percent solution of the gelatin, prepared under normal non-sterile conditions and maintained at 37°C.

**A-8.1 Procedure** — For a general test, prepare a 20 percent solution of the gelatin in water by the method specified in **A-2.1**. Allow the solution to cool to room temperature ( or to just above its gelatin point, whichever is the higher ) and transfer it to a clear glass jar or conical flask. Half fill the container and cover its mouth with polyethylene film to prevent drying of the sample.

**A-8.1.1** Store the samples in an incubator maintained at a temperature of 37°C. Remove daily from the incubator, and examine immediately for putrefaction. Cool to room temperature or to below the normal gel temperature, whichever is the lower, and examine for liquefaction or mould growth. Replace as soon as possible in the incubator for a further day.

**A-8.1.2** If required the test may be extended by maintaining a similar set of samples at room temperature (  $27 \pm 2^\circ\text{C}$  ), which conditions may be more favourable for growth of some organisms.

**A-8.2 Test Report** — Report the times when liquefaction, putrefaction, mould growth or any combination of these occur, and mention any circumstances which may have affected the result.

## A-9. DETERMINATION OF INSOLUBLE MATTER

### A-9.1 Apparatus

**A-9.1.1** *Glass Three Piece Funnel* — 7 cm dia.

**A-9.1.2** *Glass Filter Circles* — Grade GF/A 7 cm dia.

**A-9.1.3** *Flask* — 100 ml.

**A-9.1.4** *Weighing Bottles*

**A-9.1.5** *Beakers*

**A-9.1.6** *Vacuum Pump*

**A-9.2 Procedure** — Weigh 2 to 2.5 g of sample and place into the flask, add 50 ml water, shaking flask whilst addition is taking place to ensure that all the gelatin is thoroughly wetted out.

**A-9.2.1** Allow to stand for about 1 hour, then gently warm to 55-60°C to dissolve the gelatin, and make up to 100 ml.

**A-9.2.2** The glass filter, which has been previously dried in a weighing bottle as 105°C for 2-3 hours is weighed and placed in the three-piece funnel, vacuum applied and the gelatin solution is filtered. The flask and filter are washed thoroughly with 200-300 ml hot water. The filter is then removed and returned to the weighing bottle and allowed to dry at 105°C and then re-weighed.

### A-9.3 Calculation

$$\text{Insoluble matter, percent by mass} = \frac{\text{Increase in mass of glass filter} \times 100}{\text{Mass of sample taken for the test}}$$

## A-10. DETERMINATION OF WATER ABSORPTION

**A-10.1 Principle** — Water absorption of gelatin is determined as the proportion of water absorbed by the powder of stated grist under specified conditions of time and temperature.

**A-10.2 Preparation of Sample** — Powder the sample so as to be retained on IS Sieve 160 and pass through IS Sieve 320. Should the original sample be finer than this grist, it shall be used without further treatment, and a note of the grist made in the report.

### A-10.3 Procedure

**A-10.3.1** Weigh 10 g of the prepared sample into a 300 ml square beaker containing 100 ml of cold water. Leave the vessel for 16 hours in a thermostatic bath maintained at a temperature of 10°C. Occasionally stir contents with a glass rod at the earlier stages to prevent caking. Then pour off the supernatant water through a funnel fitted with a strainer of stretched damp muslin approximately equivalent to IS Sieve 160. Measure the quantity of water passing through the funnel in 5 minutes.

**A-10.3.2** If a thermostat is not available, approximate results may be obtained if the cooling is carried out by the use of running tap water, but this is not satisfactory with very low grade gelatin as particles tend to melt.

### A-10.4 Calculation and Report

#### A-10.4.1 Calculation

$$\text{Water absorption per gram of gelatin} = \frac{100 - V}{10}$$

where

$V$  = volume of water in ml passing through the strain.

**A-10.4.2 Report** — State the amount of water absorbed, the grist and the temperature in the report.

## A-11. DETERMINATION OF GREASE CONTENT

**A-11.1 Principle** — After saponification of the sample with alcoholic potassium hydroxide solution, the ether-soluble material is recovered and weighed.

### A-11.2 Reagents

**A-11.2.1 Acetone**

**A-11.2.2 Diethyl Ether**

**A-11.2.3 Potassium Hydroxide** — 1 N solution in ethanol.

**A-11.2.4 Hydrochloric Acid** — 10 percent (*m/m*) (3 N) solution.

### A-11.3 Procedure

**A-11.3.1** Soak 10 grams of the powdered sample in 15 ml of cold water in a porcelain basin until the water is all absorbed, and heat the basin on a water bath until solution is complete. Add 40 ml of the potassium hydroxide solution. Evaporate the solution on a water bath and dry the residue in an oven at 105°C. Dissolve the residue in 100 ml of the hydrochloric acid solution and keep on a steam bath for 30 minutes. Transfer the solution to a separating funnel and dilute to approximately 100 ml with water.

**A-11.3.2** When cool, add 50 ml of the ether and mix thoroughly, but not so vigorously as to form a stable emulsion. Allow to stand until completely separated and run the ethereal solution into another separating funnel. Repeat this twice with further 50 ml of ether. Wash the combined ethereal solution with 50 ml portions of cold water until free from acid (3 to 4 washings). Transfer to a tared flask and distill off the ether on a steam bath, then add 3 ml of the acetone and distill off for 2 minutes on a steam bath in a gentle current of air. When dry, cool in a desiccator and weigh. Calculate the grease content as a percentage by mass of the sample.

**A-11.4 Test Report** — Report the result obtained and any circumstances which may have affected the results.

## A P P E N D I X   B

*( Clause 5.1 )*

### SAMPLING OF GELATIN FOR SIZING OF PAPER

#### **B-1. GENERAL REQUIREMENTS OF SAMPLING**

**B-1.0** In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

**B-1.1** Samples shall not be taken at a place exposed to the adverse effects of weather.

**B-1.2** The sample instruments and sample containers shall be clean and dry.

**B-1.3** Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

**B-1.4** To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

**B-1.5** The samples shall be placed in suitable, clean, dry and air-tight glass or other suitable containers on which the material has no action.

**B-1.6** The samples containers shall be of such a size that they are almost completely filled by the sample.

**B-1.7** Each sample container shall be suitably stoppered and sealed air-tight after filling, and marked with full particulars of the material ( see 4.2 ), the date of sampling and the lot and batch number.

**B-1.8** Samples shall be stored in a cool and dry place.

#### **B-2. SCALE OF SAMPLING**

**B-2.1** **Lot** — All the containers in a single consignment of the material drawn from a single batch of manufacture and of same grade shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture, the batches shall be marked separately and the group of containers in each shall constitute separate lot.

**B-2.1.1** Samples shall be tested for each lot for ascertaining the conformity of the material to the requirements of the specification.

**B-2.2** The number ( $n$ ) of containers to be selected at random from the lot shall depend on the size of the lot and shall be in accordance with Table 2.

**TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED FROM LOTS OF DIFFERENT SIZES**

( Clause B-2.2 )

LOT SIZE <i>N</i>	SAMPLE SIZE <i>n</i>
(1)	(2)
Up to 15	3
16 " 40	4
41 " 110	5
111 " 180	6
181 " 300	7
301 " 500	8
501 " 800	9
801 and above	10

**B-2.3** These containers shall be chosen at random from the lot. For random selection procedures, guidance can be had from IS : 4905-1968\*. In case this standard is not available, the following procedure shall be adopted:

Arrange all the containers in the lot in a systematic manner and starting from any container count them as 1, 2, 3, ..... up to  $r$ , where  $r$  is the integral part of  $N/n$  ( $N$  and  $n$  being the lot size and sample size respectively). Every  $r$ th container thus counted shall be withdrawn to constitute the sample.

### **B-3. TEST SAMPLES AND REFEREE SAMPLES**

**B-3.1** From each of the containers selected according to **B-2.3** draw with an appropriate sampling instrument a representative portion of the material, sufficient for carrying out the tests specified under **B-4**. These shall constitute the individual samples.

**B-3.2** From each of the individual samples, small but equal quantity of the material shall be taken and thoroughly mixed to constitute a composite sample.

**B-3.3** The material in the individual and composite test samples shall be divided into three equal parts and transferred to separate bottles, sealed and labelled with full identification particulars of the sample (see **B-1.7**). The material in each such bottle shall constitute a test sample. Separate these test samples representing individual and the composite samples into three identical sets of test samples.

\*Methods for random sampling.

**B-3.4 Distribution of Test Samples —** One set of test samples shall be sent to the purchaser and another to the supplier. The third set of test samples bearing the seals of the purchaser and the supplier shall constitute the referee sample to be used in case of dispute between the purchaser and the supplier, and shall be kept at a place agreed to between the purchaser and the supplier.

#### **B-4. NUMBER OF TESTS**

**B-4.1** Tests for determination of gel strength, viscosity, and keeping quality shall be carried out on individual samples.

**B-4.2** Tests for determination of the remaining characteristics shall be performed on the composite sample.

#### **B-5. CRITERIA FOR CONFORMITY**

**B-5.1 For Individual Samples —** For these characteristics which are tested on individual samples, the means and range of test results shall be computed as follows:

$$\text{Mean} (\bar{X}) = \frac{\text{sum of the individual test results}}{\text{number of test results}}$$

$$\text{Range} (R) = \text{difference between the maximum and minimum values of test results}$$

**B-5.1.1** For declaring the conformity of the lot to the specified requirements of gel strength  $\bar{X} - 0.6 R$  computed from the test results shall be greater than or equal to the relevant limits prescribed in Table 1. The conformity criterion for viscosity shall be that when  $\bar{X} + 0.6 R$  computed from the test results it shall lie within the limits prescribed in Table 1. The conformity criterion for keeping quality shall be that when  $\bar{X} \pm 0.6 R$  computed from the test results shall be less than or equal to the relevant limits prescribed in Table 1.

**B-5.2 For Composite Sample —** For declaring the conformity of the lot to the requirements of all the characteristics tested on the composite sample (see B-4.2), the test results shall comply with the corresponding specified values.

TO

IS:11227-1985 SPECIFICATION FOR GELATIN  
FOR SIZING OF PAPER

[Page 4, clause 3.2, Table 1, Sl No. (iii)] -  
Substitute the following for the existing  
requirement:

(1)	(2)	(3)	(4)	(5)	(6)
iii)	Gel strength, g, <u>Min</u>	400	350	250	A-5

**AMENDMENT NO. 2 AUGUST 1989**  
**TO**

**IS: 11227-1985 SPECIFICATION FOR  
GELATIN FOR SIZING OF PAPER**

(Page 16, clause A-10.3.1, line 2) -  
Substitute '200 ml' for '100 ml'.

(CDC 15)